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2	4F18 Hdqs.		
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APPROVAL		DISPATCH	RECOMMENDATION
COMMENT		FILE	RETURN
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NATIONAL SECURITY INFORMATION

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Central Intelligence Agency



Washington, D. C. 20505

DIRECTORATE OF INTELLIGENCE.

23 May 1984

MEMORANDUM FOR: Mr. Donald Anderson  
Director, Office of Chinese Affairs  
Department of State

25X1

FROM:

Chief, China Division  
Office of East Asian Analysis

SUBJECT: Sales of PRC Electronic Grade Silicon  
to the USSR

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We reviewed the question of possible sales of PRC electronic grade silicon to the USSR in our memo to Assistant Secretary Wolfowitz of 11 August 1983 (attached).

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EA M 84-10110

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The Department of State made a demarche to the Chinese Ambassador on the issue of possible Chinese provision to the USSR of electronic grade silicon materials, specifically wafers, on 15 September 1983. On 23 September, the US Embassy in Beijing made a similar demarche to officials of the China Electronics Import and Export Corporation (CEIEC), a branch of the Ministry of Electronics Industry. [REDACTED]

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We continue to believe that the Chinese leadership would not authorize sales of materials that could enhance Soviet military capabilities. However, the general guidelines that encourage all Chinese enterprises and corporations to increase export earnings are still in force and provide a strong incentive for selling wherever they can. Further, recent efforts by Beijing to strengthen central supervision of foreign trade lead us to believe that its information about and ability to control the activities of China's many trading entities is imperfect. [REDACTED]

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Attachment: [REDACTED]

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SUBJECT: Sales of PRC Electronic Grade Silicon to the USSR

Distribution:

National Security Council

- 1 - David Laux, Senior Staff Assistant for China, Taiwan and Hong Kong

Department of State

- 2 - Donald Anderson, Director, Office of Chinese Affairs

Department of Commerce

- 3 - Eugene K. Lawson, Deputy Assistant Secretary for East Asia and Pacific

Department of Defense

- 4 - Stephen D. Bryen, Deputy Assistant Secretary for Economic Trade, and Security Policy

- 5 - Steward A. Ring, USN, Director, East Asia and Pacific Region

Central Intelligence Agency

- 6 - NIO/OEA  
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10 - Ch/China  
11 - OEA/DEV

OEA/CH/DEV, [REDACTED]

(22 May 84)

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SERIES B 9 of 11

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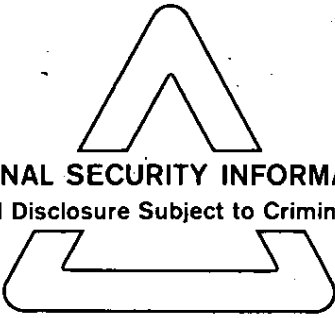
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Central Intelligence Agency



Washington, D.C. 20505

## DIRECTORATE OF INTELLIGENCE

11 AUG 1983

MEMORANDUM FOR: Mr. Paul Wolfowitz  
Assistant Secretary of State for  
East Asian and Pacific Affairs  
Department of State

FROM: [REDACTED] 25X1  
Deputy Director of East Asian Analysis

SUBJECT: China/USSR: Production and Imports of  
Electronic Grade Silicon

In response to your request for information on Soviet production and imports of electronic grade silicon, and the availability and quality of Chinese material, we are providing the following information. [REDACTED]

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Background

While we cannot confirm a sale, a COCOM ally recently suggested that PRC-origin single crystal silicon wafers, produced with US-supplied manufacturing machinery, may be finding their way to the USSR through third country intermediaries. We also are reminded of an earlier reservation by another COCOM member to the US sale of crystal growing furnaces to China in early 1981, and the need for a licensing requirement stating that the silicon produced with this equipment be used for Chinese domestic consumption only and not be exported. [REDACTED]

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The USSR and other Warsaw Pact states have chronic shortages of electronic grade silicon. The COCOM embargo on both silicon and the machinery used to produce it, however, has prevented the USSR from tapping the ample supplies available from Western and Japanese producers. The PRC has surplus supplies of electronic grade silicon and Chinese trade officials and silicon producers may see the USSR as a potentially lucrative outlet for these surpluses. [REDACTED]

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China's negotiations for possible sales of wafers probably were arranged under general guidelines that encourage all Chinese industrial enterprises to increase export earnings. It is highly doubtful, however, that the Chinese leadership would authorize a sale that enhanced Soviet military capabilities. We believe [REDACTED]

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these transactions--like some aspects of China's sale of nuclear materials--suggest that some elements of the bureaucracy, including probably the Foreign Ministry, are not always included in decisions of this kind. [REDACTED]

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### Soviet Production of Silicon

Soviet production of electronic grade silicon (both polycrystalline and monocrystalline) is well below domestic consumption. We estimate that as of early 1982 the USSR had a production capacity of about 300 metric tons of polysilicon per year. At the same time, domestic consumption of polycrystalline silicon in the Soviet Union was estimated at 500 metric tons a year which is roughly equivalent to 250 tons of monocrystalline silicon or single crystal material (see attached Chart). The gap between consumption and production--about 200 metric tons or 40% of domestic needs--was filled by imports from the West. [REDACTED]

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The quality of Soviet-made silicon is believed to be inferior to that which is imported, and inadequate for the production of various types of advanced devices. Hence, the Soviets probably use imported silicon to improve production yields and to produce its most advanced types of micro-electronics. Domestically produced material is probably used in the manufacture of more conventional lower priority items. [REDACTED]

### Imports

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The USSR has been importing Western electronic grade silicon in significant quantities since about 1975. Soviet purchases prior to this were sporadic and of negligible quantities. The surge in silicon imports since 1975--directly related to the rapid growth in Soviet semiconductor production--has outstripped the growth in capacity of domestic silicon producers. Also, the rapid pace in Soviet integrated circuit development to support both military and civilian needs generated requirements for silicon purity levels and varieties of material beyond the existing capability of the domestic producer. [REDACTED]

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### Controls

Prior to 1980, existing COCOM controls on electronic grade silicon enabled the USSR to purchase virtually all the materials that it required. Following the Afghanistan invasion, greater restriction was placed on silicon exports to the USSR, and COCOM agreement was obtained to tighten silicon controls--although at a somewhat less restrictive level than the US had requested. The COCOM action, referred to as the "1980 Compromise", left significant gaps in the control of silicon material exports:

o Polysilicon - Controls appeared to cover only the material. It was not clearly stated whether the technology to produce polycrystalline silicon was also proscribed.

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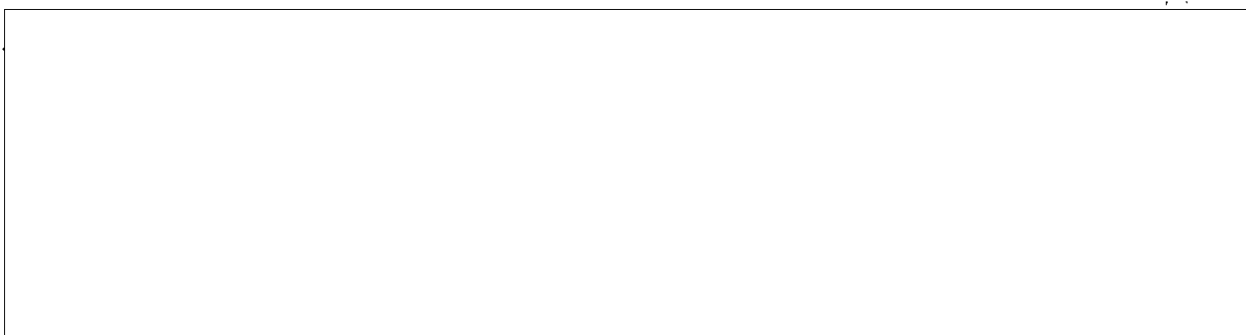
o Monosilicon ingots - Exports of ingots were controlled. It was not clear, however, whether the technology and equipment to produce monocrystalline silicon was also proscribed.

o Monosilicon wafers - Wafers were only partly controlled. For example, through "Administrative Exception Notes" the following types of wafers could be exported: all "N" type 1-1-1 material; a large part of "P" type 1-1-1 material; and a small part of "N" type 1-0-0 material. Thus, only "P" type 1-0-0 material was tightly controlled. [redacted] 25X1

The modified controls emanating from the "1980 Compromise" appeared to have only limited effect in curtailing exports of silicon wafers to the USSR. Many violations went undetected because the technical detail needed to determine the exportability of a specific wafer [redacted] 25X1

[redacted] Also, when there was evidence to suggest that at least some of the wafers were restricted and were being shipped illegally, exporting countries would claim that only exportable types under the "Administrative Exception Notes" or non-embargoed material were being sold. [redacted] 25X1

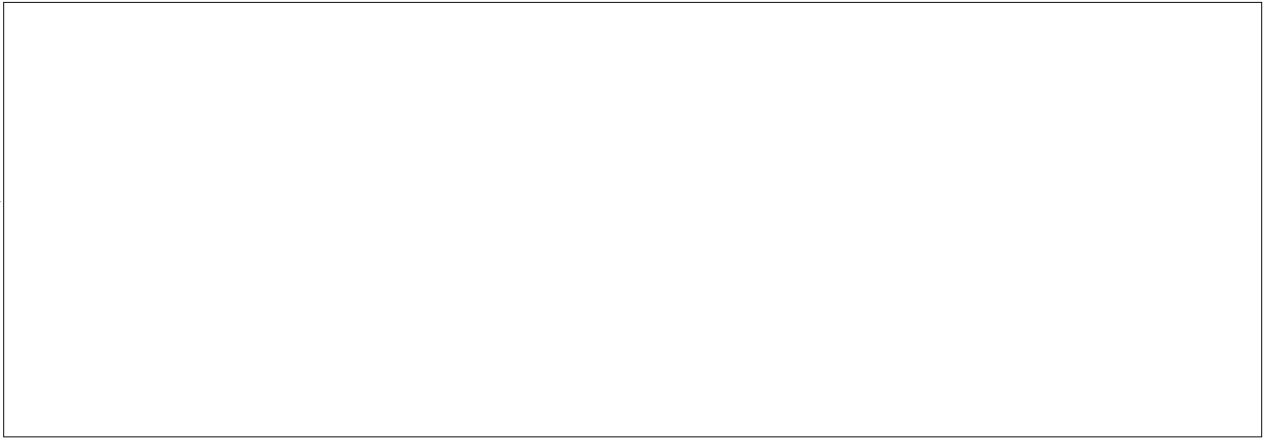
#### China's Silicon Offer

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[redacted] The COCOM regulation states that monocrystalline silicon in the form of wafers (slices) or ingots (boules) having a resistivity of 50 ohms centimeter or less for all "N" type and for "P" type 1-1-1, or 100 ohms centimeter or less for "P" type 1-0-0 are restricted. [redacted] 25X1

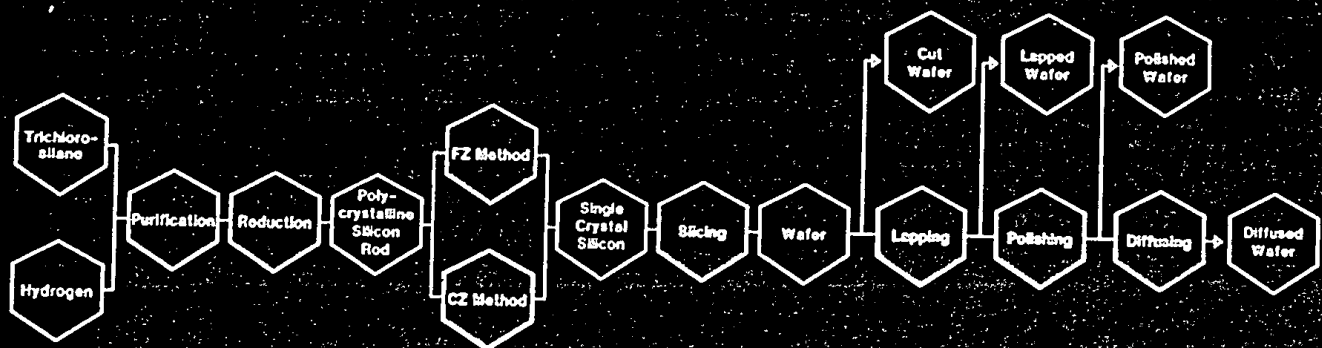
We might further note that prior to 1982 there was no evidence of a Chinese offer or sale of monocrystalline silicon wafers outside of the PRC. As indicated in our previous memoranda, China has sold polycrystalline silicon material abroad including some supplied to the USSR. Until recently China has only been able to produce silicon wafers with diameters of 1.5 25X1 2.0 inches. These generally were of uneven quality and not acceptable on the international market. [redacted]

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## Silicon Production Process



CRA02.001